Labour Taxation and Foreign Direct Investment

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Abstract

This paper analyzes the implications of effective taxation of labor for profits and, hence, the location decision of a multinational enterprise. We set up a stylized partial equilibrium model and, presuming that worker effort is a function of net wages, assume that a higher employee-borne tax burden reduces effort. In turn, this raises a firm's production costs and reduces efficiency. Accordingly, we show that a higher employee-borne income tax negatively influences a multinational's profit by reducing manager effort. Furthermore, we compile data on personal income tax profiles for 49 economies and the year 2002. We decompose tax profiles into the component borne by employers and that borne by employees. We then determine effective tax rates for employees across four centiles of the distribution of gross wages: 33, 100, 167, and 500 percent of the average, following the OECD's Taxing Wages Approach. Apart from describing features of the personal income tax data, we use them to shed light on their role for bilateral foreign direct investment (FDI) stocks among the economies considered. Not surprisingly, personal income tax rates turn out relatively less important than profit tax rates for bilateral FDI stocks. The employee-borne part of labor taxes determines bilateral FDI significantly different from zero: both a higher employee-borne tax rate on average wages and, in particular, an increase in the progression from the average wage to five times the average wage is less conducive to headquarters location and, hence, reduces a country's bilateral outward FDI stocks.

JEL Code: F21, F23, H24, J22, J3.

Keywords: labour taxation, effort, foreign direct investment, multinational firms.

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1 Introduction

The vast literature on the effects of taxation on the investment decisions of multinational firms has until now focused almost entirely on the taxation of profits and, hence, capital (see for instance Devereux and Griffith 1998, Janeba 1998, Haufler and Schjelderup 2000, Davies 2003, Devereux and Hubbard 2003). This focus roots primarily in the presumption that capital is mobile across borders while labor is not. Recently, economists working at the interface of multinational firm activity and taxation developed interest also in issues related to the taxation of labor, in particular, of high-skilled workers such as managers and technicians. With the cross-border mobility of skilled workers, three questions surface with respect to taxation. First, whether the taxation of labor and, in particular, of well-paid labor matters at all for multinational activity such as foreign direct investment. Second, we may ask about the quantitative impact of personal income taxation relative to the taxation of profits. Third, one may be interested in the relative importance of employee-borne versus employer-borne taxes for a multinational firms' decision where to locate headquarters.

We set up a stylized partial equilibrium model to analyze the implications of effective taxation of labor for profits and, hence, the location decision of a multinational enterprise (MNE).[1] According to the comparative static analysis, wage taxes borne by high-skilled employees (or managers) reduce an MNE's profits due to reduced skilled worker effort which, in turn, leads to higher production costs. Higher employer-borne taxes on high-skilled labor ceteris paribus have a direct negative impact on a firm's profits, whereas higher employee-borne taxes indirectly affect an MNE's profits by reducing managers' effort. With higher employee- or employer-borne taxes on well-paid labor in a country and high-skilled labor services in MNEs primarily tied to headquarters (as typically assumed in models of MNEs, see Markusen, 2002), it becomes more profitable to set up an MNE abroad and serve consumers in that country through the local subsidiary of a foreign-

[1] Implicitly, also the literature on the impact of labor costs on MNE activity considers employee- and employer-borne taxes on wages (see Markusen, 2002 and Becker et al. 2005). These studies, however, do neither decompose labor cost into the 'net wage' and the 'tax' component, nor do they disentangle the employees' and the employers' tax burden in the role for MNEs.

owned MNE. Consequently, we argue that higher taxes on well-paid workers' wages reduce a country's attractiveness for headquarters location and, hence, its outward foreign direct investment.

We infer the hypotheses about the impact of employee- and employer-borne taxes on labor (besides taxes on profits) on bilateral outward FDI in a large cross-sectional data-set covering 49 economies in the year 2002. For this analysis, we have to compile data on labor taxation first, since such data are not available for as large a cross-section of countries. We follow the Taxing Wages approach of the OECD (see Heady, 2004) to determine the average and marginal effective tax burden on labor which includes state and local income taxes as well as social security contributions. This approach allows decomposing countries' tax profiles into the component borne by employers and the one borne by employees. Specifically, we compute the tax wedge for a single employee earning 33%, 100%, 167% and 500% of the average wage in the manufacturing sector for each of the 49 economies. Apart from the importance of average tax levels, we can then determine the role of a tax system's degree of labor tax progressivity which should influence a well-paid (high-skilled) individuals' effort and, in turn, MNE location and FDI, according to the model.

Using these effective tax rates and bilateral outward FDI stocks among 49 countries for the year 2002, our findings document that the employee-borne part of labor taxes determines bilateral FDI significantly different from zero: both a higher employee-borne tax on average wages and, in particular, a higher progression from the average wage to five times that wage seems less conducive to headquarters location and, hence, reduces a country's bilateral outward FDI.

The remainder of the paper is structured as follows. Section 2 sets up a stylized model of labor taxation and determines the impact of the latter on an MNE's profits through two channels: a direct negative effect of employer-borne labor taxes and an indirect one of employee-borne taxes through reduced effort of high-skilled workers and higher production cost on firm profits. Section 3 presents the OECD's Taxing Wages approach we rely upon and provides descriptive statistics on employer- and employee-borne taxes in our sample

of countries. The findings from the empirical analysis of the impact of labor taxes on bilateral FDI are summarized in Section 4. Finally, Section 5 concludes with a summary of the most important findings.

2 Why should personal income taxes matter for MNE location and activity?

At first glance, it seems obvious why a firm cares about employer-borne taxes of high-skilled workers who are elemental to firm set-up (such as technicians or managers): higher employer-borne taxes and social security contributions (given wages of employees) lead to higher unavoidable costs of production unless the firm can either pass these costs on to its workers. It is somewhat less obvious, why a firm should care about the labor tax burden levied directly on its employees. With regard to the latter, we argue that managers' and technicians' effort is elemental for the efficient organization of production processes. At given gross wages, the employee-borne labor tax burden determines net wages. Presuming that worker effort is a function of net wages, we assume that a higher employee-borne tax burden reduces effort and, in turn, raises a firm's production costs and reduces efficiency. Furthermore, we argue that skilled labor services are primarily tied to a multinational's headquarters. Therefore, effort of managers and technicians at the headquarters location determines such a firm's world-wide level of efficiency and, hence, production costs for each production facility.

There is an extensive literature in personnel economics showing that incentives and different compensation policies indeed matter for an individual's effort.[2] Two lines of research suggest a positive nexus between wages and worker effort—the literature on efficiency wages and the one on equity. Yet, the underlying mechanisms are different: efficiency wage theory (see Akerlof and Yellen, 1986) assumes that workers compare opportunities *outside the firm* with their current pay so that higher net wages reduce the

[2]See Ehrenberg (1990) and Pendergast (1996) for excellent reviews of work on the effect of compensation policies.

attractiveness of outside opportunities and, hence, induce higher worker effort;[3] in contrast, equity theory uses pay comparisons *inside the firm* for the link between pay and effort (see Lawler, 1968). Empirically, the nexus between net wages and worker effort is well documented in empirical work using field data (see Lazear, 2000;[4] Asch, 1990; Bognanno and Ehrenberg, 1990; and Kahn and Sherer, 1990).

In the sequel, we apply a model of Lazear (1996b) to look into the role of personal income taxes borne by managers for a firm's profits as we are interested in the question of where an MNE will decide to locate its headquarters. The MNE's headquarters can be located in country A or B, respectively. By definition, a horizontal MNE will serve consumers in either market from a local production facility. Furthermore, the MNE employs a manager or technician at its headquarters and this employee's primary task is organizing production efficiently which we assume to be reflected in the positive relationship between (incompletely observable) manager effort e_i with $i = A, B$ and the firm's output.

For this, assume that a manager's wage w_i consists of two components: α which is independent of output and a piece rate component βQ_i where Q_i is the sum of output sold in the domestic economy q_i and in the foreign economy q_i^*, i.e., $Q_i = q_i + q_i^*$[5]. The parameters α and β are chosen by the firm's shareholders. Moreover, the manager is subject to a tax on its income denoted by t_i. Accordingly, net of tax pay of the manager employed by the $i-$borne MNE respectively is determined as

$$w_i = (\alpha + \beta Q_i)(1 - t_i) \text{ where } i = A, B. \tag{2.1}$$

Output is a function of effort e_i, which in itself depends positively on the wage and

[3] There is a small sub-literature on the impact of taxes on employment versus unemployment in efficiency wage models (see Pisauro, 1991). However, such models have not been used to study employee- versus employer-borne effects of taxes on MNE activity.

[4] Using data from Safelite Glass Corporation, a large US installer of automobile glass, Lazear shows that changing the compensation towards a performance linked pay increased the average productivity. The productivity effects amount to a 44 percent increase in output per worker. Thus, the author shows that not only the firm's output but also its profits increased with the move towards a system of piece rate pay. The author concludes that half of the increase in productivity results from the average worker producing more because of incentive effects (see also Lazear, 1996a). Accordingly, the direct link between a worker's effort and a firm's output shows that the variables which might influence an employee's effort are of key interest to a company.

[5] We assume for simplicity that $\alpha_A = \alpha_B = \alpha$ and $\beta_A = \beta_B = \beta$.

negatively on the tax $e_i'(t_i) < 0$, and luck v. v can also stand for a measurement error. The measurement of effort is normalized to unity so that output is determined as

$$Q_i = e_i + v \text{ where } i = A, B \tag{2.2}$$

Furthermore, we follow the related literature in assuming that working involves some disutility which is captured by the distaste function $C(e_i)$, maintaining $C'(e_i) > 0$ and $C''(e_i) > 0$. The manager's labor supply for the $i-$borne MNE is derived by maximizing her pay earned from working less the distaste costs involved. From the first-order condition, we obtain

$$C'(e_i) = \beta(1 - t_i), \tag{2.3}$$

which suggests that manager effort increases with β and decreases with the tax rate t_i. Thus, higher taxes reduce effort or time of active working.

The MNE's objective is to maximize its profits π_i, subject to the wage compensation it has to pay to its managers.[6] Profits depend in each case on expected output $E(Q_i)$:[7]

$$\pi_i = E(Q_i) - (\alpha + \beta e_i). \tag{2.4}$$

By choosing α and β accordingly, the firm can maximise its profits

$$\underset{\alpha,\beta}{Max}(E(Q_i) - (\alpha + \beta e_i)) = \underset{\alpha,\beta}{Max}[\, e_i - (\alpha + \beta e_i)] \tag{2.5}$$

subject to the manager's participation constraint. The latter entails that the manager is willing to take up the job in the $i-$borne MNE and may be formalized by

$$(\alpha + \beta Q_i)(1 - t_i) \geq C(e_i). \tag{2.6}$$

[6] We abstract here from other additional variable costs such as interest costs on capital or low-skilled employee costs, since we focus on the headquarters location choice of the MNE.

[7] Of course, the MNE's Q_i consists of output in A and B.

Substituting eq. (2.6) into eq. (2.4), the MNE's maximization problem translates into

$$Max \ \left[e_i - \frac{C(e_i)}{1-t_i} \right]. \tag{2.7}$$

From the first-order condition for the latter, we derive

$$e_i'(\beta)[1 - \frac{C'(e_i)}{1-t_i}] = 0 \tag{2.8}$$

such that the manager will supply effort up to the point where her net-of-tax earnings $1-t_i$ for the last unit of effort supplied just compensate her for the associated marginal cost of effort $C'(e_i)$. Accordingly, we can infer the following relationship between labor taxes borne by managers and the MNE's profits:

Proposition 1 *The employee-borne income tax negatively influences an MNE's profit by reducing the manager's effort.*

$$\frac{d\pi_i}{dt_i} < 0. \tag{2.9}$$

Proof. Differentiating eq. (2.7) with respect to the income tax we obtain

$$\begin{aligned} & e_i'(t_i) - \frac{C'(e_i) \cdot e_i'(t_i) \cdot (1-t_i) + C(e_i)}{(1-t_i)^2} \\ = \ & e_i'(t_i) \left(1 - \frac{C'(e_i) \cdot (1-t_i) + C(e_i)}{(1-t_i)^2} \right) < 0, \end{aligned} \tag{2.10}$$

since $e_i'(t_i) < 0$ and $(1-t_i)^2 - C'(e_i) \cdot (1-t_i) + C(e_i) > 0$ by assumption.[8] ■

Therefore, one can state that the firm will be concerned with the effective tax burden faced by its manager since a high tax burden reduces manager effort and thus the firm's profits. Moreover, given that effort decreases with the tax rate $e_i'(t_i) < 0$, one can infer that a higher marginal tax burden on labor also reduces profits. Thus, if a firm may choose between two headquarters locations which only differ with respect to the marginal tax

[8] Notice that $(1-t_i)^2 > 0$ and $C'(e_i) < 0$.

burden on managers or technicians, it will ceteris paribus decide in favor of the country where skilled labor faces lower effective average and marginal tax rates.

Moreover, the profits of the MNE are affected under the above mentioned assumptions only by the tax rate prevailing in the country where the headquarters are located such that $\frac{d\pi_B}{dt_A} = 0$ ($\frac{d\pi_A}{dt_B} = 0$). We have thus illustrated how an increase in the domestic income tax rate on managers reduces the attractiveness of a market for headquarters location.

From our analysis, we may infer that a high-income-tax country will therefore rather host foreign-owned subsidiaries than headquarters. Such a country will conduct less outward FDI than others, since the high income tax negatively influences manager effort and productivity as well as firm output. We will assess this hypothesis empirically in Section 4.

In the following, we turn to the OECD Taxing Wages Approach to show how the effective tax burden on employees may be determined.

3 The OECD's Taxing Wages Approach

We compute the effective average and marginal tax rates of employees earning 33%, 100%, 167% or 500% of the average wage in the manufacturing sector for 49 countries in the year 2002 (see OECD, 2002, and Heady, 2004). According to this approach, the average effective tax burden T^A is defined as the ratio between the sum of the average labor income tax T^L, the social security contributions paid by the employee T^{SE1} and the social security contributions paid by the employer T^{SE2}, divided by the sum of the gross wage $\tilde{w}$ and the social security contributions paid by the employer T^{SE2}. Accordingly,

$$T^A = \frac{T^L + T^{SE1} + T^{SE2}}{\tilde{w} + T^{SE2}}. \tag{3.11}$$

Using, for instance, the following numbers for Italy in 2002, one can compute an effective average tax rate on labor of 45.6 per cent.

Overview: Average effective tax rates on labor in Italy

	in €
1. Gross earnings	20582.5
2. Ded. for social sec. contributions (=8.)	1893.6
3. Taxable income (=1-2)	18688.9
4. Tax liability	4121.2
5. Tax credit	490.6
6. Final tax (=4.-5.)	3630.6
7. State and local income taxes	168.2
8. Employee soc. sec. contributions (=9.2% of 1.)	1893.6
9. Employer soc. sec. contributions (=33.08% of 1.)	6808.7
10. Effective average tax rate (=(6.+8.+9.)/(1.+9.))	**45.6 %**

Moreover, we decompose this average effective tax burden into an employee-borne tax wedge (ITE) and an employer-borne tax wedge (ITR). ITE is defined as the share of the labor income tax (T^L) plus social security contributions paid by the employee (T^{SE1}) and the overall gross wage plus the employer's contributions ($\tilde{w}+T^{SE2}$). ITR is defined as the ratio between the employer's social security contributions (T^{SE2}) and the overall labor cost to the employer which includes the gross wage ($\tilde{w}+T^{SE2}$) and the aforementioned contributions.

$$ITE = \frac{T^L + T^{SE1}}{\tilde{w} + T^{SE2}};\ ITR = \frac{T^{SE2}}{\tilde{w} + T^{SE2}}. \tag{3.12}$$

Furthermore, given that the progressivity of a tax system also influences effort and thus labor supply, we compute the progressivity of each country's labor tax system which is relevant for well-paid workers. Accordingly, we compute (a) the ratio of the difference between the average effective tax rates for an individual earning 500% and 100% of the average wage, $ITE(500) - ITE(100)$, and the average effective tax for an individual earning the average wage in the manufacturing sector and (b) the ratio of the difference between the average effective tax rates for an individual earning 100% and 33% of the average wage, $ITE(100) - ITE(33)$, and the average effective tax for an individual earning

33% of the average wage in the manufacturing sector

$$ITP_{500\_100} = \frac{ITE(500) - ITE(100)}{ITE(100)};\ ITP_{100\_33} = \frac{ITE(100) - ITE(33)}{ITE(33)} \qquad (3.13)$$

The higher this value is, the stronger is the progressivity of a country's tax system. We hypothesize that manager or technician effort declines in the progressivity of the labor tax for high wages, i.e. ITP_{500_100}.

Figures 1a,b and c show the correlation between the employee and the employer tax wedge for an individual earning the average wage, five times the average wage or 33% of the average wage in the manufacturing sector in the 49 countries. From Figure 1a one can see that the employee tax wedge is almost independent of the employer tax wedge. The mean of the employee tax wedge is 17.5% , the standard deviation is 7.9%, and the minimum and maximum values are found in Mexico and Denmark with 1.85% and 42.65%, respectively. The mean and standard deviation of the employer tax wedge for an employee earning the average wage amount to 15.8% and 7.8%, respectively. The minimum value is recorded for Denmark with 0.6% and the maximum value for Ukraine with 30.6%. These values of the employer tax wedge do not change much if we consider an employee earning five times the average wage. However, given the progressivity of the tax system, the values for the employee tax wedge change considerably (see Figure 1b). For an individual with a wage of five times the country's average wage, the mean employee tax wedge amounts to 28.7% and the standard deviation is 12.2%. For low wages, as depicted in Figure 1c, the mean employee tax wedge is around 11.3% and it is even 0 in Macedonia or Ireland, for instance, whereas it reaches a maximum value of 35.1% in Denmark. Regarding the employer tax wedge for an employee earning 33% of the average wage, the mean is slightly higher with 16.3%. The minimum with around 1.8% is reached in Denmark whereas Ukraine records the highest employer tax burden with almost 31% (see Figure 1c).

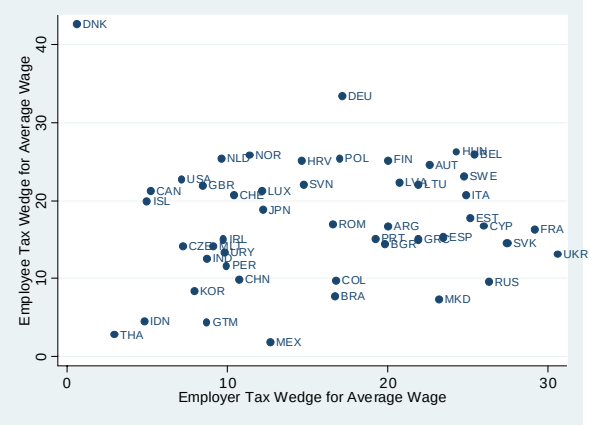

Fig. 1a: Employer vs. Employee Tax Wedge for the Average Wage

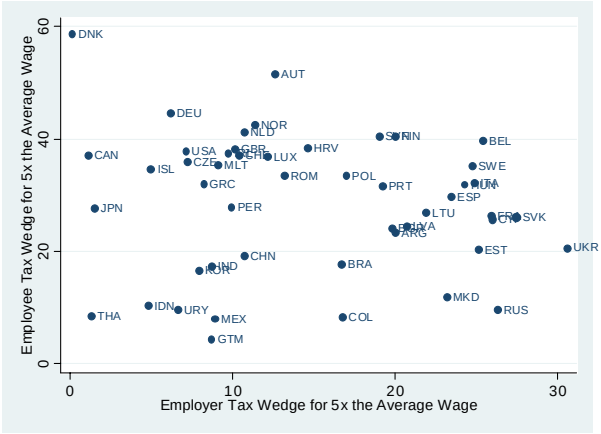

Fig. 1b: Employer vs. Employee Tax Wedge for 500% of the Average Wage

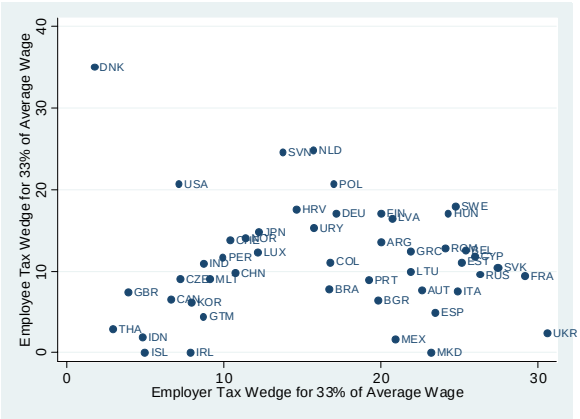

Fig. 1c: Employer vs. Employee Tax Wedge for 33% of the Average Wage

Finally, the scatter-plots in Figures 2a and 2b depict the relationship between the

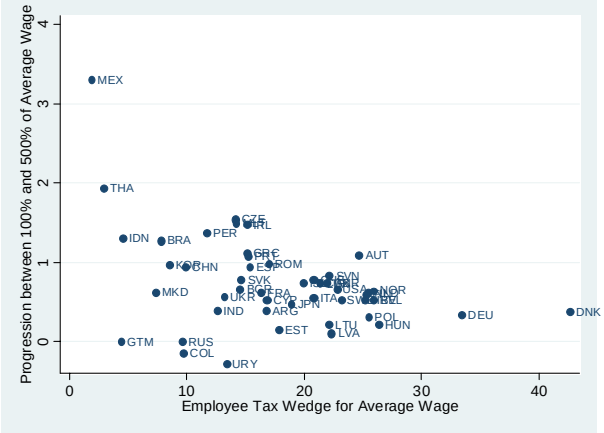

Fig.2a: Employee Tax Wedge for Average Wage vs. Tax Progression between Average Wage and 5x the Average Wage

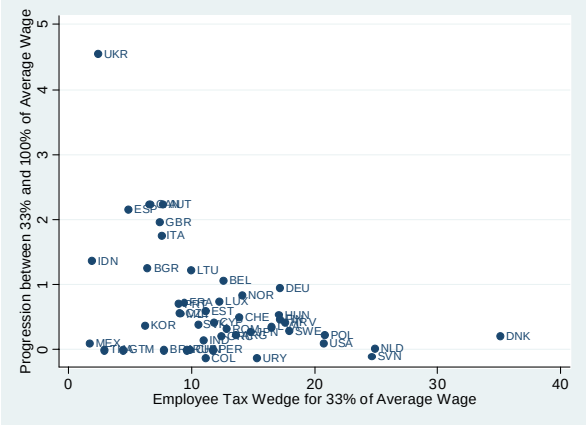

Fig.2b: Employee Tax Wedge for 33% of Average Wage vs. Tax Progression between 33% and 100% of Average Wage

progression measures of the respective tax system (denoted as ITP_{500_100} and ITP_{100_33} above) and the employee tax wedge $ITE(100)$ and ITE(33), respectively.

One can note a clear negative relationship. The higher the tax burden of an employee earning the average wage (or 33% of the average wage), the lower is the progression of the respective country's tax system. Or, put differently, given that a country already has high labor income taxes and social security contributions borne by employees, it can not afford to tax higher incomes even more progressively since this would have negative incentive effects on the employees' effort.

4 Empirical Analysis

4.1 Empirical hypotheses about the impact of personal income taxation on bilateral foreign direct investment

As we indicated before, there are two major routes along which taxation of income should affect the activity of firms in general and of multinationals in specific. First, given average wages gross of taxes, a higher fraction of average wages that is taxed away at the expense of workers leads to lower worker effort. Higher labor-borne taxes on personal income should then have a negative impact on productivity and, hence, on the prevalence of MNEs to locate in such a country. In particular, we argue that countries with very high labor-borne effective tax rates on personal income will not be candidates for the location of headquarters, where highly productive labor is particularly important. Accordingly, we may formulate the first testable hypothesis as follows.

Hypothesis 1: A higher labor-borne effective tax rate on personal income – given gross wages – reduces a country's ability to attract headquarters. In particular, a larger difference in such tax rates between a potential parent and a host country will reduce the associated bilateral FDI stock.

This argument should be especially important for skilled employees and managers required in the set-up of headquarters of firms and, even more so, of multinationals. The gross income of such employees typically falls in the highest income tax bracket. The second hypothesis may then be formulated as follows.

Hypothesis 2: A stronger progression of the labor-borne effective tax rate on personal income – given gross wages and the level of the average labor-borne tax rate on personal income – reduces a country's ability to attract headquarters. In particular, a larger difference in the associated progression between a potential parent and a host country will reduce the associated bilateral FDI stock.

One could be tempted to expect similar hypotheses for the employer-borne level and progression of income tax rates. Yet, employer-borne contributions are not progressive at all in the sample of economies considered below (see Figures 1a and 1b). However, given gross wages, the level of employer-borne wage tax contributions represents an additional cost to the firm and should influence an MNE's location decision. This leads to the last hypothesis we will consider in the subsequent empirical analysis.

Hypothesis 3: A higher employer-borne effective tax rate on wages – given gross wage costs – negatively affects a country's ability to attract headquarters. In particular, a larger difference in such tax rates between a potential parent and a host country should negatively affect the associated bilateral FDI stock.

In the subsequent empirical analysis, we infer these hypotheses, controlling for other observable variables. It is the aim of the next sub-section to introduce the empirical specification and the variables in use, the sources of data, and summary statistics thereof.

4.2 Specification and Data

In the empirical analysis, we use the log of bilateral stocks of outward FDI among 49 economies for the year 2002 (for which data on profit and personal income taxation are available)[9] as the dependent variable. Data on stocks of outward FDI are taken from UNCTAD's Foreign Direct Investment database. Regarding notation, we use subscripts i and j to indicate parent and host countries throughout so that the dependent variable in the econometric benchmark model may be written as LFDI_{ij}.

The explanatory variables used to determine bilateral FDI stocks may be collected in three categories: gravity model variables (or economic fundamentals) such as parent

[9]The countries included in our data-set are the following: Argentina, Austria, Belgium, Brazil, Bulgaria, Canada, China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, India, Indonesia, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Mexico, Netherlands, Norway, Peru, Poland, Portugal, Romania, Russia, Slovak Republic, Slovenia, South Korea, Spain, Sweden, Switzerland, Thailand, Turkey, Ukraine, United Kingdom, United States, Uruguay.

Given the enormous effort necessary to collect profit taxes and the level as well as effective personal income tax data for such a wide sample of countries, this paper's focus has to be on cross-section data analysis.

and host country size (GDP), parent and host country average wages per employee, and bilateral distance between the parent and the host economy (which commonly serves as a compound measure of bilateral trade and investment costs among these countries); profit tax variables based on statutory corporate tax rates and depreciation allowances (or fixed cost deductibility parameters) of the parent and the host economy as well as two indicator variables reflecting whether the credit method or the exemption method are applied bilaterally to avoid or reduce double taxation of foreign-earned, repatriated profits; finally, we use personal income tax variables based on the effective rates of contribution of employers versus employees at average wages and the progression of the employees' contribution.

Let us focus more closely on how the variables used in the specification are actually constructed, and what their sources are. Table 1 provides summary statistics we refer to below, especially, with the personal income tax variables covered.

Gravity model variables

We use the gravity model variables in logarithmic form on the right-hand side of the empirical model: LGDP_i and LGDP_j indicate parent and host country log GDP, respectively (from the World Bank's World Development Indicators 2006); LWAGE_i and LWAGE_j refer to parent and host country log average wages per worker, respectively (from OECD(2002) and UN).[10] Bilateral distance is measured in kilometers and computed using the great circle method based on coordinates of the parent and host's capitals. Again, we use the log of bilateral distance, LDIST_{ij}.

Profit tax variables

Regarding the profit tax variables, we hypothesize that parent country firms will more likely set up production plants in a host country if the corporate statutory tax rate is higher at home than abroad (see Egger, Pfaffermayr, Loretz, Winner, 2008). To capture

[10] Markusen (2002) and Blonigen, Davies and Head (2003) use a different functional form for two countries' GDP than we do, and they employ relative factor endowment variables rather than wages. However, elements of our specoification are based on partial equilibrium reasoning so that relative factor endowments do not apear. In general, with bilateral rather than multilateral FDI, factor cost variables are as quasi-exogenous as GDP and can be used instead of relative factor endownment variables.

this relationship, we introduce the parent-to-host statutory corporate tax rate differential (TAX_i-TAX_j) as an explanatory variable in the model. Moreover, we hypothesize that a similar differential for tax deductibility parameters, i.e., depreciation allowances ($DEPR_i$-$DEPR_j$), exhibits the opposite sign. The reason for the latter is that better depreciation allowances in the parent country render the set-up of production facilities abroad unattractive to firms. On top of these tax rates and depreciation allowances, countries establish bilateral tax law, mostly through tax treaties. Such treaties have two purposes: to reduce the profit tax burden on foreign-earned, repatriated profits and to exchange information to limit multinational firms' possibilities of tax avoidance. The net effect of such treaties is therefore ambiguous. We include two dummy variables that are based on unilateral as well as bilateral, treaty-based regulations about the regime of double taxation relief in place: $CREDIT_{ij}$(referring to the credit method) and $EXEMPT_{ij}$ (referring to the exemption method). One should not expect any particular sign for the parameters of these dummy variables in the empirical model, since it is impossible to distinguish between the true double taxation relief effect and the information exchange effect of bilateral tax treaties. These variables were collected by Egger, Pfaffermayr, Loretz, Winner (2008), using information from national tax codes as well as bilateral tax treaties.

Personal income tax variables

As for personal income tax rates, we use three variables as indicated in Hypotheses 1-3 before. The first one is based upon the effective tax rate on personal income borne by employees with an average wage (ITE). This amounts to the difference between gross income visible to the employee and her net income relative to the gross income. In our data, ITE varies between about 1.9 percent (Mexico) and about 42.7 percent (Denmark) across countries. Similar to profit tax rates, we use the corresponding difference in parent-to-host contributions (ITE_i-ITE_j). Furthermore, we compute the progression in ITE between an employee with a wage that is five times higher than the average and the average earner relative to the average. We refer to this measure of progression by the acronym ITP. The latter varies between -0.64 (or about -63.5 percent; Austria) and 3.31 (or about 331 percent; for Mexico) in the data. Similar to ITE, we include the difference

between parent and host country (ITP_i-ITP_j) as a determinant of FDI in our empirical model.

< Table 1 >

Finally, we include the employer contributions as a counterpart to ITE in the model. Let us use the acronym ITR for the corresponding variable, which varies between 0 (Austria, Chile, and New Zealand) and about 30.6 percent (Ukraine) in our data, according to Table 1. Similar to ITE, we include the parent-to-host difference (ITR_i-ITR_j) of this variable as a determinant of the parent's bilateral outward FDI in the model in the model.

4.3 Estimation results

In all estimations carried out, we assume that the stochastic error term is uncorrelated with variables belonging in the three aforementioned groups of determinants. Generally, we do not require the disturbances to be identically distributed across country-pairs. Therefore, we report standard errors which are robust to heteroskedasticity. Table 2 summarizes the parameter estimates from a set of ordinary least-squares models. We estimate three models in Table 2 to shed light on the contributions of different blocs of variables to the total variance in LFDI.

< Table 2 >

Model 1 only includes the fundamental gravity model control variables. Not very surprisingly, these five variables together with the constant alone explain (the log of) bilateral outward FDI stocks quite well: they account for more than 56 percent of the variation in the data.

Adding the mentioned four profit tax variables in Model 2 leads to a non-trivial increase in explanatory power when using the adjusted R^2 (hence, taking the loss of degrees of freedom in Model 2 relative to Model 1 taking into account): Model 2 explains more than 62 percent of the variation in bilateral FDI, and we may state that it works about as

well as bilateral gravity models do for the log of bilateral exports. As for the parameter estimates of the profit tax variables, we find – in accordance with our expectations – that a larger discrepancy in statutory tax rates between the parent and the host country leads to more outward FDI. The reason is that it then pays off to locate production abroad for profit tax reasons. Higher depreciation allowances in the parent country relative to the host should render the former relatively more attractive for activities involving high fixed costs – such as headquarters. Hence, we expect a positive parameter for this variable. Indeed, the point estimate turns out positive, yet we can not estimate the parameter significantly at conventional levels. The negative parameters of the credit and exemption dummies most likely capture adverse effects on FDI associated with information exchange effects (and, hence, the reduced possibilities of shifting profits and charging transfer prices by multinational firms).

In Model 3, we add the three personal income tax variables to the ones in Model 2. Several findings there are worth noting. First of all, the overall explanatory power of the model is only marginally increased. Yet, this is not surprising. We would have found the results suspicious, if personal income taxation had turned out more important than profit taxation for bilateral FDI. Second, the parameters of (ITE_i-ITE_j) and (ITP_i-ITP_j) are significantly different from zero and negative. The latter results are supportive of the worker-effort-related Hypotheses 1 and 2 – headquarters are less likely to be located in countries, where average wage taxes (ITE_i-ITE_j) or their progression (ITP_i-ITP_j) are relatively high.[11] In other words, countries where skilled workers and managers have to sacrifice a larger portion of their gross wages will less likely host headquarters and conduct bilateral outward FDI. Third, given gross wages, the employer tax burden negatively influences a country's ability to attract headquarters as suggested by Hypothesis 3, as these contributions also represent additional costs a firm has to incur. However, the latter impact cannot be estimated significantly different from zero.

[11] Since our primary emphasis is on the role of wage taxes on high-wage income earners such as managers or technicians, we use ITE(500)-ITE(100)–i.e., the progression of employee-borne wage taxes from the average wage to five times the average wage–in percent to define ITP. We will shed light on the role of wage progression for low-wage earners based on ITE(100)-ITE(33) in the sensitivity analysis.

In the remainder of this section, we assess the robustness of these findings in various regards: the importance of influential observations, the sample composition, the inclusion of additional control variables, and the functional form assumption about of the stochastic process. Table 3 summarizes the corresponding findings which should be compared to the benchmark results in Model 3 of Table 2.

< Table 3 >

Model 3a in the table represents a least-absolute deviations (median) regression. Overall, the parameter estimates in this model are very similar to Model 3 in Table 2. This suggests that our original findings were not driven by influential observations in the tails of the distribution. Models 3b and 3c indicate that our conclusions for the impact of personal income tax rates apply qualitatively for both intra-OECD and extra-OECD FDI relationships. Also the other results in these models are qualitatively similar to each other and the original ones in Table 2.

Model 3d includes additional control variables such as the difference in skilled labor endowments between the parent and the host country (suggested by Markusen, 2002; using secondary school enrolment ratios from the World Bank's World Development Indicators 2006; not significant), the difference in an index capturing political institutions between the parent and the host country (using the Polity IV data-set; not significant); the number of years since the last war between the parent and the host country (using the Armed Conflict Dataset provided by the International Peace Research Institute; significant at 1 percent); the cumulative number of months of war between the parent and the host country since 1940 (using the aforementioned Armed Conflict Dataset; significant at 1 percent). Descriptive statistics of these variables are provided in Table A1 of the Appendix. A comparison of the results in Model 3d with those in the original Model 3 indicates that the original findings were not biased by our focus on a more parsimonious model.

Model 3e represents a Poisson Pseudo-maximum likelihood (PPML) model rather than an ordinary least-squares approach. Santos Silva and Tenreyro (2006) indicated for

trade data that depending on the nature of the measurement error of bilateral exports, heteroskedasticity may lead to biased parameter estimates. This bias can be avoided in a PPML model with heteroskedasticity-robust standard errors. The same argument applies, of course, with data on bilateral stocks of outward FDI. Again, the results indicate that such a bias seems to be of minor importance in our application. This conclusion is derived from the similarity of the parameter estimates in Models 3 and 3e. However, the negative parameter of (ITE_i-ITE_j) can not be estimated significantly any more. Yet, that one of the tax progression variable (ITP_i-ITP_j) which seems more relevant for manager or technician income, even gained in importance relative to the original results.

Finally, Model 3f estimates a log-linear FDI specification as in Model 3, but it includes the parent-to-host difference in the wage tax progression for low-income employees. The latter variable is based on the progression of the wage tax from one third of the average wage to the average wage in percent. However, it turns out that this variable does not exhibit an impact on FDI stocks which is significantly different from zero (see the parameter estimate and standard error for Model 3f at the bottom of the table). Hence, the results confirm our view that the progression for high-wage earners is more important for FDI location than that of low-wage earners.

5 Concluding Remarks

This paper reports on a large data-set on labor income taxation among 49 economies. We provide descriptive comparisons with respect to the taxation of the salaries of average income earners and the corresponding progression.

We set up a stylized partial equilibrium model to analyze the implications of effective taxation of labor for profits and, hence, the location decision of a multinational enterprise. We argue that managers' and technicians' effort is elemental for the efficient organization of production processes. At given gross wages, the employee-borne labor tax burden determines net wages. Presuming that worker effort is a function of net wages, we assume that a higher employee-borne tax burden reduces effort and, in turn, raises a firm's pro-

duction costs and reduces efficiency. Furthermore, we argue that skilled labor services are primarily tied to a multinational's headquarters. Effort of managers and technicians at the headquarters location determines such a firm's world-wide level of efficiency and, hence, production costs for each production facility. A higher employee-borne income tax negatively influences an MNE's profit by reducing manager effort. Thus, if a firm may choose between headquarters locations which differ with respect to the marginal tax burden on well-paid workers such as managers and technicians, it will ceteris paribus decide in favor of a country where well-paid labor faces lower effective average and marginal taxes.

In the empirical part of the paper, we shed light on how important the taxation of labor income is for outward foreign direct investment (FDI) relative to profit taxation. Moreover, we consider the role of the contributions of employers versus those of employees across four centiles of the distribution of gross wages: at 33 percent, 100 percent, 167 percent, and 500 percent of the average. Not surprisingly, personal income tax rates turn out somewhat less important than profit tax rates (in terms of their marginal contribution to explaining the variance of bilateral outward FDI stock data). However, the employee-borne part of labor taxes determines bilateral FDI significantly different from zero: both a higher employee-borne tax on average wages and, in particular, a higher progression from the average wage to five times the average wage is less conducive to headquarters location and, hence reduces a country's bilateral outward FDI.

Table 1 - Summary statistics

Variables in use		Mean	Std. Dev.	Minimum	Maximum
Dependent variable					
Log foreign direct investment$_{ij}$	$LFDI_{ij}$	4.460	3.523	-6.389	12.378
Gravity model control variables					
Log GDP$_i$	$LGDP_i$	26.080	1.734	21.973	29.939
Log average wages per worker$_i$	$LWAGE_i$	9.643	1.030	5.656	10.748
Log distance$_{ij}$	$LDIST_{ij}$	7.422	1.173	3.806	9.339
Profit tax variables					
Statutory corporate tax rate$_i$	TAX_i	30.176	6.968	10.000	42.100
Statutory corp. tax differential$_{ij}$	(TAX_i-TAX_j)	1.312	9.288	-28.840	28.840
Depreciation allowances$_i$	$DEPR_i$	54.388	12.116	0.000	98.262
Depreciation allowance differential$_{ij}$	$(DEPR_i-DEPR_j)$	1.269	15.326	-57.337	89.958
Credit method of double taxation relief$_{ij}$	$CREDIT_{ij}$	0.342	0.464	0.000	1.000
Exemption method of double taxation relief$_{ij}$	$EXEMPT_{ij}$	0.128	0.157	0.000	0.421
Personal income tax variables					
Tax paid from average wage by employee$_i$	ITE_i	19.193	7.583	1.857	42.651
Tax paid from average wage by employee differential$_{ij}$	(ITE_i-ITE_j)	1.434	10.680	-39.738	40.794
Progression of tax paid by employee$_i$	ITP_i	0.657	0.546	-0.635	3.310
Progression of tax paid by employee differential$_{ij}$	(ITP_i-ITP_j)	0.022	0.722	-2.930	2.842
Tax paid on average wage by employer$_i$	ITR_i	15.196	8.613	0.000	30.556
Tax paid on average wage by employer differential$_{ij}$	(ITR_i-ITR_j)	-0.168	11.587	-29.143	29.143

Notes: The progression variables for ITP correspond to ITP_{500_100} in terms of equ. (3.13).

Table 2 - Regression analysis of the impact of corporate versus personal taxation on bilateral foreign direct investment

Explanatory variables		**Model 1**		**Model 2**		**Model 3**	
Gravity model control variables							
Log GDP_i	$LGDP_i$	0.938	***	1.000	***	0.995	***
		0.042		0.048		0.049	
Log GDP_j	$LGDP_j$	0.796	***	0.864	***	0.868	***
		0.042		0.050		0.051	
Log average wages per $worker_i$	$LWAGE_i$	0.975	***	1.147	***	1.271	***
		0.062		0.071		0.081	
Log average wages per $worker_j$	$LWAGE_j$	-0.009		0.383	***	0.285	***
		0.058		0.089		0.099	
Log $distance_{ij}$	$LDIST_{ij}$	-0.861	***	-1.054	***	-1.067	***
		0.059		0.063		0.064	
Profit tax variables							
Statutory corp. tax $differential_{ij}$	$(TAX_i\text{-}TAX_j)$	-		1.953	**	1.644	*
		-		0.898		0.934	
Depreciation allowance $differential_{ij}$	$(DEPR_i\text{-}DEPR_j)$	-		0.290		0.479	
		-		0.522		0.529	
Credit method of double taxation $relief_{ij}$	$CREDIT_{ij}$	-		-1.170	***	-1.170	***
		-		0.229		0.233	
Exemption method of double taxation $relief_{ij}$	$EXEMPT_{ij}$	-		-3.568	***	-3.825	***
		-		0.818		0.833	
Personal income tax variables							
Income tax paid on average income by employer $differential_{ij}$	$(ITR_i\text{-}ITR_j)$	-		-		-0.004	
		-		-		0.006	
Income tax paid on average income by employee $differential_{ij}$	$(ITE_i\text{-}ITE_j)$	-		-		-0.032	***
		-		-		0.010	
Progression of Income tax paid by employee $differential_{ij}$	$(ITP_i\text{-}ITP_j)$	-		-		-0.296	**
		-		-		0.123	
Observations (country-pairs)		1055		1055		1055	
Adjusted R^2		0.561		0.626		0.629	
Root mean squared error		2.305		2.155		2.147	

Notes: ***, **, * are indicating statistical significance at 1, 5, and 10 percent, respectively (using two-tailed test statistics). Standard errors are robust to heteroskedasticity. The progression variables for ITP correspond to ITP_{500_100} in terms of equ. (3.13).

Table 3 - Sensitivity analysis of Model 3 in Table 2

Explanatory variables		**Model 3a**		**Model 3b**		**Model 3c**		**Model 3d**		**Model 3e**		**Model 3f**	
Gravity model control variables													
Log GDP_i	$LGDP_i$	0.996	***	1.077	***	0.897	***	1.011	***	0.988	***	1.018	***
		0.053		0.058		0.075		0.048		0.098		0.051	
Log GDP_j	$LGDP_j$	0.882	***	0.951	***	0.842	***	0.874	***	0.645	***	0.829	***
		0.053		0.086		0.078		0.051		0.077		0.053	
Log average wages per $worker_i$	$LWAGE_i$	1.307	***	2.496	***	1.110	***	1.245	***	1.269	***	1.189	***
		0.089		0.189		0.117		0.085		0.221		0.082	
Log average wages per $worker_j$	$LWAGE_j$	0.327	***	0.074		0.119		0.278	***	0.850	***	0.363	***
		0.105		0.154		0.141		0.104		0.152		0.103	
Log $distance_{ij}$	$LDIST_{ij}$	-1.122	***	-1.284	***	-1.153	***	-1.078	***	-0.662	***	-1.071	***
		0.074		0.086		0.117		0.064		0.085		0.066	
Profit tax variables													
Statutory corp. tax $differential_{ij}$	$(TAX_i\text{-}TAX_j)$	1.734	*	2.208	*	0.775		1.669	*	-2.050		2.410	**
		1.041		1.258		1.547		0.929		1.706		1.135	
Depreciation allowance $differential_{ij}$	$(DEPR_i\text{-}DEPR_j)$	0.367		2.055	**	-0.403		0.161		1.746		0.114	
		0.511		0.863		0.669		0.531		1.066		0.566	
Credit method of double taxation $relief_{ij}$	$CREDIT_{ij}$	-1.306	***	-0.634		-1.224	***	-1.139	***	-1.207	***	-1.395	***
		0.249		0.649		0.365		0.235		0.292		0.246	
Exemption method of double taxation $relief_{ij}$	$EXEMPT_{ij}$	-3.966	***	-1.285		-6.842	***	-3.932	***	-3.001	***	-4.607	***
		0.891		1.830		1.258		0.834		0.946		0.892	
Personal income tax variables													
Income tax paid on average income by employer $differential_{ij}$	$(ITR_i\text{-}ITR_j)$	-0.001		0.011		-0.018		-0.003		0.022		-0.004	
		0.007		0.009		0.011		0.006		0.012		0.007	
Income tax paid on average income by employee $differential_{ij}$	$(ITE_i\text{-}ITE_j)$	-0.023	**	-0.023	*	-0.070	***	-0.029	***	-0.0001		-0.020	**
		0.011		0.013		0.017		0.010		0.008		0.009	
Progression of Income tax paid by employee $differential_{ij}$ (100%-500%)	$(ITP_i\text{-}ITP_j)$	-0.222	*	-0.433	**	-0.585	***	-0.258	***	-0.384	***	-0.233	*
		0.132		0.173		0.194		0.124		0.156		0.122	
Progression of Income tax paid by employee $differential_{ij}$ (33%-100%)												-0.064	
												0.057	
Observations (country-pairs)		1055		554		501		1055		1055		990	
Adjusted R^2		0.434		0.713		0.516		0.633		0.772		0.626	
Root mean squared error		1.625		1.716		2.284		2.136		-		2.131	

Notes: ***, **, * are indicating statistical significance at 1, 5, and 10 percent, respectively (using two-tailed test statistics). Standard errors are robust to heteroskedasticity. - Model 3a is a least-absolute deviation (median) regression model. The corresponding R^2 is a pseudo-R^2. - Model 3b restricts the sample to intra-OECD relationships only. - Model 3c excludes intra-OECD relationships from the data. - Model 3d includes four additional control variables: the difference in skilled labor endowments between i and j (using secondary school enrolment ratios from the World Bank's World Development Indicators 2006; not significant); the difference in the political environment index between i and j (using the Polity IV data-set; not significant); the number of years since the last war between i and j (using the Armed Conflict Dataset provided by the International Peace Research Institute; significant at 1 percent); the cumulative number of months of war between i and j since 1940 (using the aforementioned Armed Conflict Dataset; significant at 1 percent). - Model 3e is a Poisson model with robust standard errors, using the level of bilateral stocks of outward FDI as the dependent variable. - Model 3f includes the wage tax progression variables from the 33% and 100% wage bracket–referred to as ITP_{100_33} in equ. (3.13)–in addition to the ones for the 100% to 500% wage bracket (i.e., ITP_{500_100}).

Table A1 - Summary statistics for additional variables used in the sensitivity analysis				
Additional variables in use	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**
Skilled labor endowment differential of country i minus j	6.065	26.629	-103.813	96.504
Polity2 index differential of country i minus j	1.078	2.851	0.000	17.000
Number of years since last political conflict between i and j	54.921	49.537	0.000	122.000
Cumulated duration of political conflict between i and j in days since 1940	12.684	195.578	0.000	5211.000

Appendix

Table A1 contains summary statistics for the additional control variables used in the sensitivity analysis (Model 3d in Table 3).

References

[1] Akerlof, G.A. and J.L. Yellen, (eds.) (1986), *Efficiency Wage Models of the Labour Market,* Cambridge University Press, New York.

[2] Asch, B. J. (1990), Do Incentives Matter? The Case of Navy Recruiters, *Industrial and Labour Relations Review,* Vol. 43, No. 3, Special Issue: Do Compensation Policies Matter?, pp. 89S-106S.

[3] Becker, S., K. Ekholm, R. Jäckle and M.-A. Muendler (2005), Location Choice and Employment Decisions: A Comparison of German and Swedish Multinationals, *Review of World Economics* (Weltwirtschaftliches Archiv), Vol. 141 (4), pp. 693-731.

[4] Blonigen, B. A., R. B. Davies and K. E.? Head (2003), Estimatng the Knowledge-Capital Model of the Multinational Enterprise: Comment, *American Economic Review*, Vol. 93, No. 3, pp. 980-994.

[5] Bognanno, M. and Ehrenberg R. (1990), The Incentive Effects of Tournaments Revisited: Evidence from the European PGA Tour, *Industrial and Labour Relations Review,* Vol. 43, No. 3, Special Issue: Do Compensation Policies Matter?, pp. 74-89.

[6] Davies, R. B. (2003), The OECD Model Tax Treaty: Tax Competition and Two-Way Capital Flows, *International Economic Review*, Vol. 44, No. 2, pp. 725-753.

[7] Devereux, M. and G. Hubbard (2003), Taxing multinationals, *International Tax and Public Finance*, Vol. 10, pp. 469-487.

[8] Devereux, M. and R. Griffith (1998), Taxes and the location of production: evidence from a panel of US multinationals, *Journal of Public Economics*, Vol. 68, No. 3, pp. 335-367.

[9] Egger, P., M. Pfaffermayr, S. Loretz, and H. Winner (2008), Corporate taxation and multinational activity, revised version of *CESifo Working Paper* No. 1773, University of Munich.

[10] Ehrenberg, R.G. (1990), Introduction: Do Compensation Policies Matter ?, *Industrial and Labour Relations Review,* Vol. 43, No. 3, Special Issue: Do Compensation Policies Matter?, pp. 3S-12S.

[11] Haufler, A. and G. Schjelderup (2000), Corporate Tax Systems and Cross-Country Profit Shifting, *Oxford Economic Papers,* Vol. 52, No.2, pp. 306-325.

[12] Heady, C.(2004), The "Taxing Wages" Approach to Measuring the Tax Burden on Labor, in P. B. Sorensen (ed.), *Measuring the Tax Burden on Capital and Labor*, CESifo, Munich.

[13] Janeba, E. (1998), Tax Competition in Imperfectly Competitive Markets, *Journal of International Economics,* Vol. 44, No. 1, pp. 135-153.

[14] Kahn, K. and P. Scherer (1990), 'Contingent Pay and Managerial Performance', *Industrial and Labour Relations Review,* Vol. 43, No. 3, Special Issue: Do Compensation Policies Matter?, pp. 107-121.

[15] Lawler, E. (1968), Equity Theory as a Predictor of Productivity and Work Quality, *Psychological Bulletin,* Vol. 70, No. 6, pp. 596-610.

[16] Lazear, E.P. (2000), Performance Pay and Productivity, *American Economic Review,* Vol. 90, No. 5, pp. 1346-1361.

[17] Lazear, E.P. (1996a), Performance Pay and Productivity, *NBER Working Paper* No. 5672.

[18] Lazear, E.P. (1996b), *Personnel Economics*, MIT Press, Cambridge, Massachusetts.

[19] Markusen, J.R. (2002), Multinational Firms and the Theory of International Trade, MIT Press, Cambridge, MA.

[20] OECD, *Taxing Wages 2002-2003*, Organisation for Economic Cooperation and Development, Paris.

[21] Pisauro, G. (1991), The Effect of Taxes on Labour in Efficiency Wage Models, *Journal of Public Economics* Vol. 46, pp. 329-345.

[22] Prendergast, C. (1996), What Happens Within Firms? A Survey of Empirical Evidence on Compensation Policies, *NBER Working Paper* No. 5802.

[23] Santos Silva, J.M.C. and S. Tenreyro (2006), The log of gravity, *Review of Economics and Statistics* Vol. 88, pp. 641-658.

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